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grasp the hand of Lewis H. Morgan. If such men only knew how good the sight of them is to young and longing eyes, they would make sacrifices to give so much pleasure.

Encourage specialization. The closest affiliation of specialists and aggregation into a mutually helpful cooperation are necessary to the intension of a science. It can not be too compact or too lively. The moment they organize the institutional mind is born.

But to the special societies let me say that the beau ideal of learning is to know all about some and some about all. In your meetings the infimæ species of details, instruments and processes are scrutinized and discussed; but in your family gatherings all learn the results of the tedious labors of each. You acquire the ability to read or listen intelligently. Let me illustrate great things by small: There is an old man in one of the dependencies of the Smithsonian who was engaged to write up the textile arts of the American aborigines. Through its many agencies he was furnished with overwhelming material from the whole area between Point Barrow and Magellan Strait; between Nova Scotia and Attu Island. If he had possessed seven league boots, a canoe that shot past the wild geese, the hundred eyes of Argus Panoptes, the hands of Briareus and the longevity of Methusaleh it would have surpassed his powers to bring together so much. But no sooner had he sat down among the stuff than he discovered his lack of omniscience, a quality required of him before taking the first step in so comprehensive an industry. He must know chemistry for dyestuffs, geology for horizons, geography and meteorology for environments, botany thoroughly for plants, zoology for staples and implements, ethnology for peoples, philology for names, not to neglect mythology and folklore for the charming symbolism.

I will not worry you with the long list of the Covilles, Merriams, Holmeses, Houghs, Chesnuts, Willoughbys, Boases, Dorseys, Mooneys and more; nor of the many bureaus and branches of the government that gladly put themselves at his disposal; nor of the leading museums, Peabody, American, Field-Columbian, Golden Gate Park, with the rest, whose

treasures illustrate his pages. The thing that bothers him now is what name to put on the title page.

The lesson I would learn from this parable is that the highest possible specialization only makes the closest solidarity that much more necessary. The council has my blessing and best wishes and shall have my cooperation in its endeavor.

O. T. MASON.

January 19, 1904.

#### SOIL WORK IN THE UNITED STATES.

IN the *Beet Sugar Gazette*, published on December 5, 1903, on page 419 is given an account of the trip of the Secretary of Agriculture through the beet sugar region of Michigan. At Rochester the Secretary made an address in which are found the following words:

"When I went to Washington I found that we had no knowledge of the soils and I went to work and organized a bureau of soils and have over two hundred scientists engaged in this work. I shall send a corps of soil physicists next year to every sugar factory in Michigan to examine the soils, and the information which the Department of Agriculture obtains is at your disposal."

In many other public addresses the Secretary of Agriculture has given expression to similar sentiments, and especially has he criticized the colleges and universities of the United States, because, as alleged, they fail to train their students in such a way as to make them valuable to the Department of Agriculture.

We all know that the Secretary of Agriculture means well and does the best he can for the interests over which he presides. Under his energetic administration, the activity of the Department of Agriculture has been materially increased, and its usefulness greatly enhanced. He does not pretend to be a scientific expert, and we must presume that his ideas on scientific work are mainly the result of the environment in which he lives. It, therefore, becomes an interesting question whence has come to him the information that the agricultural colleges fail to train students usefully in agriculture; that the uni-

versities are doing nothing for the promotion of agricultural science; and that at the time he came to Washington, and until the Bureau of Soils was established, nothing was known about soils—meaning, presumably, the soils of the United States.

In the light afforded by Bulletin No. 22 of the Bureau of Soils, which I have recently discussed in the columns of *SCIENCE*, the source of the Secretary's information is not far to seek. Having departed from all precedent in the matter of soil work, whether in the field or in the laboratory, in the old world or in the new, the Bureau of Soils simply declares all former soil work to be '*nul et non avenue*'—void and of no effect; and so informs the Secretary.

In view of the existing records, this seems an extreme liberty to take with the facts of the case. It is true that in some of the states, the public surveys and even some stations have taken the soil features but very little into account. But in many others, the soil features have been quite elaborately observed, elaborated and discussed. Beginning more than half a century ago, David Dale Owen conducted the work of the geological surveys of Kentucky and Arkansas; and we find in the reports of these surveys not only the chemical analyses of several hundred soils from these two states, but, accompanying them, descriptions of their physical and agricultural characters, as well as of their native vegetation. Following the lead of Owen, the present writer undertook similar work in connection with the geological and agricultural survey of Mississippi, and from 1857 to 1873 continued these studies from the physical, chemical and botanical standpoint. In 1880, being in charge of the report on cotton production of the Tenth Census of the United States, he undertook to compile detailed agricultural descriptions of the cotton-producing states (then including California), which were elaborated largely by the respective state geologists, and form parts of Vols. V. and VI. of the Census report of 1880. There are embraced within these volumes extended descriptions and maps of the several soil areas in these states, with 612 chemical and 12 physical

analyses of soils, fully discussed in their bearings on agriculture. In 1892, the Department of Agriculture published, as Bulletin No. 3 of the Weather Bureau, a paper prepared by myself 'On the Relations of Soils to Climate,' in which among other things there is given a discussion of 779 analyses of soils of the United States, and of the nature, occurrence and reclamation of alkali lands.

Since that time many other states have entered upon similar lines of work; among them especially Minnesota, Texas, South Carolina, North Dakota, Washington, Idaho, Wyoming, Michigan and Rhode Island, in some cases with very elaborate cultural data and discussion. The entire number of soil analyses made in the United States thus far is probably in excess of 1,500.

In the face of all these facts, of which the records are easily accessible, especially at Washington, the Secretary of Agriculture has evidently been informed that practically no soil work worthy of the name had been done in this country until the present Bureau of Soils was organized by him; and has thus been induced to think it a matter of first necessity to send over two hundred scientists (*sic*) into the various states to fill these glaring deficiencies. Evidently it *has* been possible for the Bureau of Soils to find within the United States so large a body of qualified soil experts. The phenomenal rapidity with which these observers map the soil areas laid down in the reports of the bureau, seems to show that this feat has been accomplished. How well the work so done will stand the test of criticism from the scientific and practical standpoint remains to be seen.

E. W. HILGARD.

UNIVERSITY OF CALIFORNIA,

January 8, 1904.

#### SPECIAL ARTICLES.

PRELIMINARY REPORT ON THE CLASSIFICATION OF  
THE ROCKS OF THE WATKINS GLEN (30')  
QUADRANGLE (U. S. GEOLOGICAL  
SURVEY).\*

DURING the summer of 1903 Henry S. Williams assisted by Edward M. Kindle made the

\* By permission of the Director of the U. S. Geological Survey.